

How the Blue LED Changed the World, and Won a Nobel Prize

By Stav Ziv

Their inventions have found their way into bedside lamps, television screens, and smartphones, and have the potential to give light to the 1.5 billion people who don't have access to electricity grids, [according to the Nobel Assembly](#).

In recognition of this, scientists Isamu Akasaki, Hiroshi Amano and Shuji Nakamura, whose invention of blue light-emitting diodes (LEDs) "triggered a fundamental transformation of lighting technology," were awarded this year's Nobel Prize in Physics, [the Nobel Assembly announced Tuesday](#).

"Their inventions were revolutionary. Incandescent light bulbs lit the 20th century; the 21st century will be lit by LED lamps," [the assembly said in a press release](#). Before the three finally succeeded in making semi-conductors produce blue light beams in the late 1980s and early 1990s, scientists had been struggling with the challenge for three decades. Red and green LEDs existed, but the absence of blue made it impossible to create white light.

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Akasaki and Amano, working as a team at Nagoya University in Japan, and Nakamura, working separately at Nichia Chemicals, a small company in Tokushima, and now at the University of California, Santa Barbara, built their own equipment and did thousands of experiments in the late 1980s, succeeding in [obtaining the bright blue light](#) from semiconductors. In the 1990s, the three scientists were able to make the blue LEDs more efficient.

The prize, the assembly says, is meant to reward inventions that provide the most "benefit to mankind," as per the wishes of Alfred Nobel. This invention has already changed the way we light buildings as well as the screens in our living rooms, on our desks, and in our pockets, and has the potential to provide light where electricity is hard to come by and clean polluted water, [according to the assembly](#).

"These uses are what would make Alfred Nobel very happy," said Professor Olle Inganäs, a member of the prize committee from Linköping University, [according to BBC News](#).

Here are five ways blue LEDs have changed our lives, according to information provided by the Nobel Assembly:

White Energy-Efficient LED Lamps

The laureates' inventions made white LED lamps possible. Since LEDs convert electricity directly into light, rather than wasting the majority of energy on heat, "we now have more long-lasting and more efficient alternatives to older light sources," [according to the assembly](#).

Traditional light bulbs emit light with an efficiency of 16 lumen per watt (lm/W). Fluorescent lights multiply that at 70 lm/W, but current LED lamps leave even those in the dust, with a recent record of roughly 300 lm/W.

"As about one-fourth of world electricity consumption is used for lighting purposes, the highly energy-efficient LED lamps contribute to saving the Earth's resources," [according to the assembly](#).

TV, Computer and Phone Screens

Without blue LEDs, televisions, computers, and phones wouldn't have backlit liquid-crystal display (LCD) screens, which are built with LEDs, [according to the assembly](#). LEDs also provide the flash for camera phones.

Providing Light to Those Without Electricity

LEDs are far more efficient than traditional light sources. In other words, they require less energy to provide light. In the developing world, where more than a billion people live without access to electricity grids, the efficiency of the LED means they can use cheap local solar power instead, [according to the assembly](#).

In many parts of the world, solar-powered LED could replace fuel-powered light, such as kerosene lamps, candles, and open fires, which can be "dangerous, polluting, expensive and dim," [Evan Mills, founder of the Lumina Project, told CNN in 2012](#). "LEDs the size of a cherry can generate light 100 times brighter than a kerosene lamp at a very low wattage, while solar cells have become much

more efficient."

Sterilizing Polluted Water

Ultraviolet LEDs, made possible by the blue LEDs, could help sterilize polluted water in the future, [according to the assembly](#), "as UV light destroys the DNA of bacteria, viruses and microorganisms."

Greenhouse Cultivation

Light on different parts of the spectrum influences plant growth, [according to MIT Technology Review](#). Because the color of LEDs can be controlled by computers, [according to the assembly](#), that means they can not only provide more efficient lighting in greenhouses, but also more control for growers over their plants.

"Plant scientists all over the world are currently studying this phenomenon in an effort to exploit it in future," [according to the MIT Technology review](#).


"The invention of the blue LED is just 20 years old," [the Nobel Assembly said in its Tuesday press release](#), "but it has already contributed to create white light in an entirely new manner to the benefit of us all."

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So, why was it that blue LED's were so much harder to procure than green and red?

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